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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/811,581	03/20/2001	Akira Fukunaga	FUKUNAGA-3	2108

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EXAMINER

EDMONDSON, LYNNE RENEE

ART UNIT	PAPER NUMBER
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1725

DATE MAILED: 04/22/2002

7

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/811,581

Applicant(s)

FUKUNAGA ET AL.

Examiner

Lynne Edmondson

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Double Patenting*

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

1. Claims 1, 3, 4, 5, 7 and 8 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-4 and 6 of U.S. Patent No. 6358611. Although the conflicting claims are not identical, they are not patentably distinct from each other because both teach a process of forming a composite metallic ultrafine particle having a diameter between 1 and 100 nm covered with an organic material and formed by heating. The instant claims are slightly broader than the patent claims but teach the same particle. *In re Goodman*.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1, 3, 4, 5, 7 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Nagasawa et al. (WO 98/26889 A1) using the US equivalent (USPN 6358611) as a translation.

Nagasawa teaches a composite metallic ultrafine particle comprising a metal core surrounded by an organic compound having a functional group. The particle is formed by mixing a metallic salt, oxide or hydroxide with an organic material containing a carboxyl group and heating the mixture (col 6 lines 10-22). Fatty acid salts may be employed and metal content is from 50-90 wt% (col 2 lines 7-65). The particle size is between 1 and 100 nm (col 3 lines 11-24). The mixture is heated to a temperature above the decomposition temperature of the salt but not more than that of the organic compound (col 3 line 52 – col 4 line 15). See also Nagasawa claims 1-4 and 6.

3. Claims 1-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Tomihisa et al. (USPN 5683501).

Tomihisa teaches formation of a composite metallic ultrafine particle comprising a metal core formed from a metal oxide or salt and covered with an organic compound comprising an alcoholic hydroxyl group (col 20 line 55 – col 21 line 12 and col 6 line 66 – col 7 line 15). The metal may be Ti, Si or any transition metal wherein the amount of organic material is 0.5 to 1 molecule per metal atom (col 7 lines 1-6, col 9 lines 55-65 and col 10 lines 55-67). The particle size is preferably between 5 and 100 nm (col 7 lines 40-48). The organic compound includes alcohol, acids (col 3 lines 26-36 and col 13 line 55 – col 14 line 26), amino, carboxyl or hydroxyl groups (col 6 lines 44-65 and col 18 lines 44-54). The metal salt can comprise a metal chloride, nitrate or acetate among others (col 10 lines 45-67 and col 11 line 11 – col 13 line 38) with metal present in an amount up to 99.5% (col 8 lines 4-12 and col 14 lines 27-40). The material comprises straight or branched chains (col 8 lines 54-67) and is heated under a reflux condition (col 39 lines 30-55). The mixture is heated to a temperature not greater than the decomposition temperature of the organic compound and not less than the decomposition temperature of the salt (col 7 lines 20-40). See also Tomihisa claims 1-21.

4. Claims 19-30 are rejected under 35 U.S.C. 102(e) as being anticipated by Prasad et al. (USPN 5912257).

Prasad teaches a process for producing composite metallic ultrafine particles comprising dissolving a transition metal salt (col 17 lines 1-34) in a hydrophilic nonaqueous solvent (ethanol), adding a hydrophobic solution and organic material with a functional group (lipid) (col 59 line 49 – col 60 line 17) and citric acid as a reducing agent to form a precursor gel under reflux conditions (col 25 lines 34-42). Ascorbic acid is also added as an antioxidant. The mixture may include stannous (Sn) chloride (col 35 lines 21-59) and lower alcohols or ketones as well as higher alcohols, petroleum hydrocarbons (col 22 lines 20-65 and col 26 lines 24-54) and terpenes (col 35 lines 44-55). The functional group is an alcoholic hydroxyl group (col 30 lines 24-32 and col 32 line 57 – col 33 line 39). See all Prasad claims.

5. Claims 31-36 are rejected under 35 U.S.C. 102(e) as being anticipated by Nakaura et al. (USPN 6139591).

Nakaura teaches an apparatus for forming an interconnection comprising a loading/unloading station (50, figure 1) (col 7 lines 65-67), a dispersion liquid supply device (18A,18B) for dispensing a dispersed liquid (slurry, col 1 lines 19-24 and col 8 lines 24-39), heating device (112, col 11 lines 1-10), polishing devices (378) with cleaning means (380) (col 26 line 37 – col 27 line 8) for cleaning both sides of the substrate with multiple drying means (384) (figure 21). The apparatus comprises a sensor for measuring the substrate thickness (458,A,B) located proximate the substrate on the holder (support 56) (figure 22, col 26 line 62 – col 27 line 9 and col 28 lines 12-66) which controls polishing parameters including liquid supply. The apparatus

comprises a section that is enclosed and includes means for controlling pressure such that pressure inside the enclosure is higher than outside (col 10 lines 10-44).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 31-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Danese (USPN 6272768) in view of Van Buskirk et al. (USPN 6346741 B1).

Danese teaches a method and apparatus for forming an interconnection comprising a loading/unloading station (multistation) (col 1 lines 37-51), a dispersion liquid supply device (18A, 18B) for dispensing a dispersed liquid comprising ultrafine particles (col 1 line 66 – col 2 line 19), multiple heating means (232) and sensors (col 6 lines 49-62), polishing with cleaning means and multiple drying means (col 5 lines 31 – 65) for controlled cleaning of both sides of the substrate (col 3 lines 21-26 and col 4 lines 46-58). The apparatus comprises a sensor for measuring the substrate thickness (col 8 lines 44-67) located proximate the substrate on the holder which controls polishing parameters including liquid supply (col 6 lines 1-17 and col 11 lines 25-67). The apparatus comprises a housing (col 4 lines 46-64) wherein pressure can be controlled (col 6 lines 1-8) by increasing or decreasing (col 7 lines 24-44) to create a

pressure difference between the inside and outside of the housing (col 9 lines 22-35). As shown in figures 4 and 6, the liquid may be evaporated before, during or after application of heat. However, the ultrafine particles in the liquid are not further disclosed.

Van Buskirk teaches wafer polishing to form interconnects (col 1 lines 18-29) comprising a slurry containing ultrafine particles (col 2 lines 35-50) of Si (col 4 lines 25-55 and col 12 lines 51-67) covered with an organic compound (col 6 lines 1-30). The process is monitored and controlled (col 5 lines 7-25).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use known polishing materials such as ultrafine Si particles covered with organics for quick, efficient formation of interconnects without damaging Si wafer circuitry (Danese, col 1 lines 49-65) while maintaining low levels of contamination (Danese, col 2 lines 20-40).

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Leone et al. (USPN 6369206), Das et al. (USPN 4680204, alcoholic hydroxyl nanoparticles), Unger et al. (USPN 6231834, alcoholic hydroxyl nanoparticles), Kito et al. (USPN 5328681, nanoparticles), Heath et al. (USPN 6103868, precursor), Saito et al. (USPN 5314541, apparatus) and Miller et al. (USPN 6080670, method).



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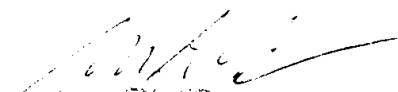
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne Edmondson whose telephone number is (703) 306-5699. The examiner can normally be reached on M-F from 7-4 with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on (703) 308-3318. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-7118 for regular communications and (703) 305-7115 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.

Lynne Edmondson  
Examiner  
Art Unit 1725

LRE  
April 18, 2002

  
M. ALEXANDRA KOTT  
PRIMARY EXAMINER